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For June Publication

Teaching in the Intermediate Grades

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State Teachers College, San Jose

By

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Supervisor of Intermediate Grades
Demonstration School, State Teachers College

and

Katharine H. Hall
Assistant Professor of Education
State Teachers College

THE data, illustrations, and suggestions in this book were compiled to help teachers in the revision of traditional intermediate grade practices and curricula and to show the new aims and methods that characterize the best of modern instruction in grades four, five, and six. The plan throughout has been to include only practices that may be employed by the average teacher in an ordinary school. Every suggestion has been clarified by copious concrete illustrations. The following are among the subjects discussed: Reading—English—Health Training—Geography—History—Science and Nature Study—Education for Citizenship—Arithmetic—Intermediate grade Projects.

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Professor Geo. R. Green

State College, Pa.

SCHOOL AND SOCIETY

Volume XXV SATURDAY, JUNE 25, 1927 Number 652

METHODS OF TEACHING THE HISTORY OF MATHEMATICS

INTRODUCTION

THIS brief statement is based upon the experience of the writer in the teaching of the history of mathematics in college and university classes and extends over a period of more than thirty years. The students have uniformly been those who expected to become teachers, generally in the secondary schools, and less frequently in the elementary schools on the one hand or the college on the other. The courses have, therefore, been planned to meet the needs particularly of those who were to teach what we usually call the elementary parts of mathematics—those extending through the first courses in the calculus. Instruction in the history of higher mathematics could not well be given in classes like those mentioned. The student of a subject like the theory of functions of a complex variable, for example, necessarily takes up the historical development of the theory in connection with the subject itself.

PREVIOUS PREPARATION OF THE STUDENTS

In the last twenty-five years of my work the students were generally college graduates who had credits for at least two years of college mathematics and who, in increasing numbers of late, had extended this to four years, often with one year of graduate work besides.

The mathematical preparation of these students was quite sufficient for the purpose, but they were generally deficient in physics, astronomy and the languages. They usually read one modern language besides English but were generally unable to obtain with any ease the meaning from the Latin works of the early Renaissance period. Italian was usually unknown to them, so that two of the most important fields of source material could be cultivated only with great difficulty by the majority of those in the elementary class.

FIRST COURSE

It has of late years, and until my retirement, been my custom to offer three courses of one year each. The elementary course was divided into two semesters, the first being devoted to a general chronological survey, with special attention to the contributions of different civilizations—the ancient Mesopotamian, Egyptian, Indian, Chinese, Greek and Roman, with their related branchings; the medieval in the East as well as in Europe; and the modern, beginning with the invention of printing in the West. The purpose has been a general view of the progress of mathematics—of the contributions of races and of individuals. The work has been conducted by lectures and, what has been more fruitful, of discussions suggested by the text-book.

The second semester was devoted to a study of the origin and development of the special branches which the students will teach. This could then be undertaken with a good historic background as prepared in the first semester, it then being unnecessary to stop to explain the influence of periods, races and individuals when discussing a topic like the historical development of algebraic symbolism or of types of problems. As in the first semester, the work

was somewhat by lectures but more commonly by a discussion of the text. Students who were specially qualified were given access to source material, and in many cases they made good use of the opportunity.

SECOND COURSE

The second course was open only to those who had taken the first course or its equivalent. The class was small, ordinarily made up of about a dozen students who had the scientific and linguistic ability to begin a year of pre-seminar work. They had free access to an extensive library on the history of mathematics and to about three thousand books and manuscripts constituting a carefully selected body of source material. They could usually read two modern languages besides English and could make fair use of Latin. Occasionally some student could read Chinese; another, Italian; and a third, some other language such as Dutch, Greek, Arabic, Russian, Hebrew or Spanish. For all these there was literature available, and worthy papers have been prepared from hitherto unpublished sources in Hebrew, Arabic and Latin.

In this course each student was asked to select a topic and to work upon it as long as he chose. Some worked upon three or four in a year; others continued the work upon a single topic through this and the seminar year.

THIRD COURSE

The third course was the seminar, and this consisted of individual work often leading to a doctor's dissertation. The student had already prepared for this course in the one that preceded it, and the instruction consisted chiefly in advice as to material and in following the development of the thesis. For such work there is available in New York five libraries, Columbia, the Public Library, the great collection of Hebrew manuscripts in the Hebrew Theological Seminary, my own collection and the remarkable library of Mr. George A. Plimpton.

In this course, before my retirement, there were written numerous papers and books which were published and which contributed materially to the history of mathematics. Since my retirement there have been a number of students working in these libraries without being registered in any university course in the subject and without any credit except such as their publications may bring them. They use my library freely during the day and have such assistance as I can give.

MATERIAL FOR ADVANCED WORK

Having now concluded this personal statement, I wish to consider two points with respect to method in the advanced courses—one relating to material equipment and the other to methods of work by students.

For this type of work a library of original material is needed. It is possible to secure this at a reasonable expenditure so far as early printed books are concerned, if one avoids incunabula and specially rare books. Any university library can afford to purchase fifty volumes of the sixteenth and seventeenth centuries, a set of the *Bibliotheca Mathematica*, one of Boncompagni's *Bullettino* and the leading histories. Even the smaller college libraries can form a working collection at not too great expense.

Manuscripts are now difficult to obtain. A library like Mr. Plimpton's could not be duplicated in these days. Our universities, however, can secure occasional specimens, and it is with these that the most interesting work is done.

Portraits of famous mathematicians can be obtained by searching for them abroad, and sometimes in this country. It took me forty years to get my collection of some 3,000, with 140 portrait medals, but a

traveler in Paris could easily find fifty. A certain amount of autograph material of the last two centuries can still be secured, but most of the rare pieces have already found permanent places in large libraries.

Old mathematical instruments, such as quadrants, astrolabes, diopters and measures are now too expensive for most institutions, and dependence will have to be placed upon illustrations such as those given in certain histories or in Bion's well-known treatise.

It is possible, therefore, to secure a fair equipment for this kind of work and at an expenditure that is not prohibitive. Such equipment has been brought together notably by Professor Cajori, at Berkeley, Professor Karpinski, at Ann Arbor, and Professor Archibald, at Brown University, and can be found in several other universities. Of course, for elementary classes none of this is essential, although it is desirable to have such material as can be secured.

METHOD OF WORK

The method of work may best be considered by mentioning a few examples.

To consider some of the most advanced type of specialists, there came to me not long ago an Arabic scholar from Vienna. He was not interested particularly in mathematics. He was given access to a library of Arabic manuscripts, there were indicated to him certain problems that needed investigation, and he has already published several valuable papers on the subject. The method has consisted in stating the problem, in giving advice as to the literature of the subject and in assistance in arranging the material secured.

A similar situation arose recently in connection with Oriental mathematics. Certain problems were stated to two Chinese students, the sources were placed at their disposal and their contributions were so important as to justify their publication.

It was through this kind of work that Professor Karpinski came to publish his translation of Robert of Chester's version of "Al-Khowârizmî," that the translation of Descartes's "La Géométrie" by Miss Latham and myself was made, and that Dr. Mary S. Day's recent translation of an unpublished manuscript of Scheubel was undertaken.

While it is interesting to work and to see others work in foreign languages, there are valuable studies to be made in English. This is seen in the recent elaborate investigation made by Dr. Lao G. Simons in the field of early mathematical work in the American colonies, and in the contribution to our knowledge of the rather obscure life of Robert Recorde, made by Miss Frances Marguerite Clarke, both of which studies have appeared within the past two years. Dr. Véra Sanford's dissertation upon the persistence of typical problems is now in process of publication.

In all these cases the method was one of cooperation with the student, directing his studies, suggesting plans of approach and assisting in finding such literature as might have some bearing upon the subject in hand. The opportunity of giving such instruction is, perhaps, the greatest reward that can come to any of us.

As to unexplored fields, there are in New York at the present time a considerable number of mathematical manuscripts deserving of critical study—some of them but little known. These include a work of *c.* 1424 by Rollandus, an extensive treatise of about the same period and probably by Canacci, an unpublished compotus of *c.* 1330, the earliest dated copy of the compotus of Anianus, several arithmetical treatises of 1400–1450, a copy of Chaucer's treatise on the astrolabe (*c.* 1425) that was known to Skeat but not used in his edition, Gebert's geometry, various copies of Euclid's "Elements," and of Boethius on the

theory of numbers (10th–16th centuries), Al-Khowârizmî's and Omar Khayyam's algebras (each complete), a considerable number of Arabic and Persian treatises (some from the Greek), a number of Sanskrit treatises (including sixteen manuscripts of Bhāskara's various works), a complete copy in Sanskrit of Varāhamihira's treatise on astronomy, numerous oriental works on the astrolabe, a copy of Matteo Ricci's Chinese translation of Euclid and numerous Japanese works. There is, therefore, in the city a large amount of manuscript material that awaits the study of scholars. Of this, the Latin manuscripts are almost exclusively in the library of Mr. Plimpton, but, like all the rest, are available for the making of photostats for the use of qualified students. Were the means available for publishing such material, it is quite certain that scholars would be prepared at the present time to make critical studies of a considerable part of it. As to the printed treatises, there are few of any importance that are not easily accessible for study; indeed, they are in constant use for this purpose at the present time.

DAVID EUGENE SMITH
TEACHERS COLLEGE,
COLUMBIA UNIVERSITY

THE REGENTS EXAMINATIONS: AN ANNIVERSARY DISCUSSION[1]

FIFTY years ago—on June 6, 1877—the New York State Legislature passed an act appropriating $5,000 "to the Regents of the University for establishing and conducting examinations as to attainments in learning."

There thus officially began a centralized examination system which was and has continued unique among the states of the union, a system which has had an important and a persistent influence. As to numerical success, consider these figures: The first "advanced examinations" in 1878 were taken by 887 pupils in algebra, 564 pupils in American history, 645 in elementary Latin, 508 in natural philosophy and 333 in physical geography. For the Regents examinations of 1927 in these five subjects there will be approximately 235,000 papers written and in all the academic examinations in approved secondary schools a total of well over 800,000 papers.

The fact is that the growth of Regents examinations has so exceeded the facilities of the examining division that officials of the education department declare, since adequate appropriations are not in sight, that the scope of the examination system must be markedly curtailed. For this curtailment they make proposals which they regard as retaining the advantages of the examinations for the highest grades in schools and as affording for the lower grades supervisory methods in harmony with current educational thought.

This half-century anniversary lends appropriateness to a sketch of certain outstanding events in Regents history and a discussion of plans for the future.

HOW REGENTS EXAMINATIONS BEGAN

Although it was not until 1877 that the legislature made legal and financial provision for advanced examinations, the Regents had experimented with elementary examinations in the preceding decade. Their educational philosophy was expressed in their annual report of 1864:

> It is the system of state competitive examinations which gives to public education in Europe much of that thoroughness and exactness which is wanting in this country, and without which schools fail everywhere to produce their highest results.

This was doctrine quite in accord with the European principle of central control upon which the University of the State of New York was created in 1784. (The university is, of course, not a university in the

[1] A paper read before the Parent-Teacher Association of Pelham, N. Y., May 4, 1927.

usual sense but is a survival of the original meaning of a corporation and indicates the organization of all the schools of the state. As Dr. John H. Finley, formerly president and commissioner of education, defined it, the University of the State of New York "has within its horizon the whole range of educational problems" and is "the remembering and aspiring soul of the state.")

For some years before 1877 the Regents printed examination papers in the elementary subjects of arithmetic, English, grammar, geography and spelling, and they utilized the results as a standard for apportioning the old Literature Fund among the academies of the state. Of these early "preliminary academic examinations" the Regents reported in 1871 that the results "have clearly indicated serious defects in elementary education."

The direct initiative for advanced examinations appears to have come from the schools themselves. At the University Convocation of July, 1876, a resolution was passed requesting the Regents "to make out an appropriate course of advanced studies, and institute examinations for the academic departments and to issue certificates to students passing the same."

When the legislature acted, in the protracted session of June, 1877, it provided for "examinations in such branches of study as are commonly taught . . . to furnish a suitable standard of graduation from the said academies and academic department of union schools" and also to furnish a standard "of admission to the several colleges of the state." Following a resolution of the University Convocation in 1878 the Regents had the cooperation, in preparing examinations, of a committee of representatives of colleges, high schools and academies. Professor Edward Worth, of Hamilton College, apparently expressed widespread opinion when he said, in a paper before the 1879 University Convocation, that "the Regents examinations for college entrance certificates have been wisely inaugurated."

Up to 1906 the Regents examinations were prepared by a staff of inspectors and examiners in the Regents office. Then the Regents created a State Examinations Board, including five representatives of the department and fifteen representatives of the colleges and secondary schools of the state. Committees of teachers appointed by this board have prepared courses of study; and both syllabus and examination in each field now may be said to represent the judgment of New York teachers and experts in that field. Recently there have been changes in the forms of certain papers and experiments with new type questions to which reference will be made later.

STEADY GROWTH—THEN A RUSH

The first twenty years of Regents examinations after the legislative act became really effective were marked by steady but moderate increases. The second twenty years, from 1900 to 1920, produced a tremendous advance, in line with the advance in secondary school enrollment in New York.

Of the period since 1920 Director Avery W. Skinner, of the Examination and Inspection Division of the Education Department, has written:

> The increase has been phenomenal; in five years the number of papers written, claimed and accepted has nearly doubled.

In addition to the present demands of the day schools, already overwhelming the available staff, there now come appeals for Regents examinations from the evening schools and the summer high schools of the state. The outcome is what Director Skinner terms "an impossible situation." Increased appropriations or curtailment would seem to be the alternatives.

THE MERITS OF THE REGENTS EXAMINATIONS

Two courses of study were provided by the Act of 1877: "the College Entrance Course and the Academic courses." The main difference was in the Latin and Greek called for in accordance with the entrance requirements of colleges in that era.

Without going into historical detail as to changes in courses and machinery of administration it may fairly be said that the Regents examinations accomplished the aim for which they were created.

On the college entrance side particularly they have been widely and effectively used. A great point of merit is, as Professor Ben D. Wood, of Columbia, has expressed it, that these examinations "give comparable measures of achievement in material to which all examinees have been approximately equally exposed and are therefore quite efficient and reliable indicators of differences in native capacity." As a college administrative officer in another state I can bear testimony to the confidence we outsiders feel in considering Regents marks as compared with the unstandardized and variable marks submitted in certificates of high schools in other states.

Professor Wood has given evidence in his book, "Measurement in Higher Education," as to the predictive value of Regents marks for success in college. "The Regents examinations are good criteria for admission to college," he declares. Professor Wood's table, presenting the correlation between the first-year scholarship scores of Columbia College students and the scores in four different admission criteria, is as follows:

TABLE 30

	r	N
Thorndike intelligence scores	.59	199
Regents examinations	.57	34
College Entrance Examination Board	.432	35
Secondary school marks	.331	67

In a report just published, "The Regents Experiment of June 1, 1925, in French, German, Spanish and Physics," Dr. Wood has pointed out weaknesses in the Regents system of reviewing papers, due largely to lack of funds, and he has stressed the reliability of the new type examination as compared with the essay type. He advocates the use of both types as minimizing the weaknesses and smoothing out the defects of both. As to the Regents "principle of uniform, centrally-administered examinations" Dr. Wood states his conclusion that it is "sound and indispensable to the wise administration of our educational system."

Among the merits of administration of the Regents examinations has been a conscious adjustment of them to advancing standards in educational measurements. Dr. Frank P. Graves, state commissioner of education, has reported changes in

> the form of papers set in English, the incorporation of a silent reading test, the inclusion of true-false recognition and completion tests in other subjects, the re-casting of algebra papers to provide similar advances, and the experimentation with a new type of examination in modern languages and physics on a scale never attempted anywhere before. . . . Power and understanding are tested as well as knowledge, and the Regents examinations have been gradually working toward a combination test, one half of which shall measure the pupil's factual knowledge and the other half the ability of the pupil to use these facts convincingly.

SHORTCOMINGS OF THE REGENTS EXAMINATIONS

Objections to specific defects of Regents examinations are less formidable than criticism of the fundamental basis of this or any external examination system. This criticism is made by the school of thought which has developed the well-known "cardinal principles of secondary education," emphasizing "the responsibility of the secondary school for planning its work so that young people may meet the needs of democracy" rather than tests imposed on other bases.[2]

[2] "Cardinal Principles of Secondary Education Bulletin," 1918, No. 35, p. 5.

A recent expression of this doctrine is that of Superintendent Jesse H. Newlon, of the Denver schools, who declares that "the dead hand of the past in the form of traditional college entrance requirements should be removed from secondary education and such curricula used as will best prepare young people for their life needs."[3]

Commissioner Graves has referred to the "demand for self-realization and the departure from uniformity to the development of the individual" as "the very essence of democracy, present-day ethics and modern educational theory."[4]

PROPOSED CHANGES IN THE EXAMINATION SCHEME

Dr. Graves states candidly his agreement with this view. He proposes important changes which would make the Regents examinations "secondary matter" and would call "for a much greater supervisory responsibility than the state has ever assumed."

Specifically the points of Dr. Graves are these:

(1) Uniform examinations may reasonably be given in the last two years of high school where "the pupils remaining have fallen into distinct and fairly homogeneous groups—college entrance, technical, vocational, commercial and general. . . . Moreover, the pupils are now somewhat older and can better submit to a three-hour test."

(2) Dr. Graves opposes state examinations for eighth grade pupils and says that, if any state test is to be given at the end of grade work, it "should consist of a single, comprehensive examination of the standard test type." He maintains that "it is even more inconsistent to impose state examinations upon the highly differentiated work of the junior high school, especially while it is passing through the present fruitful epoch of experimentation."

(3) Dr. Graves proposes a greater supervisory responsibility for the state. He makes it clear that by this he does not mean inspection by the state nor supervision that would replace the supervision of the local unit. State supervisors, under his plan, would supplement and guide. The staff attached to the state office would become a clearing-house for methods and would offer to the local supervisors "supervisory advice for a complete program from the beginning to the end of the school course." . . . "State supervisors might become most fruitful in the improvement of instruction and in the development of a strong esprit de corps in the entire teaching profession of the commonwealth."

If you should wish the opinion of a friend from a neighboring state upon the situation which confronts New York on this fiftieth anniversary of Regents advanced examinations, I should venture to suggest the following:

(1) Because of the soaring expenses involved and more especially because of their debatable effect, omit for an experimental period of five years the Regents examinations for all grades below the senior high school.

(2) Retain the Regents examinations for senior high-school students, strengthening the examinations along the lines now begun of testing quality rather than quantity in education. Use particularly comprehensive examinations and new type examinations.

That good friend of America, Ambassador Bryce, long ago pointed out the opportunities offered in our varied state systems for educational experiment. It would seem unfortunate for New York to give up its unique experiment of maintaining, alone

[3] Address before the Department of Superintendence, National Education Association, Dallas, March 1, 1927. SCHOOL AND SOCIETY, March 12, 1927, Vol. XXV, No. 637, p. 301.

[4] *New York Education*, December, 1926, Vol. XIV, No. 4, p. 226.

among the states of this country, a centralized examination system of the type long and effectively used in Europe. As that liberal scholar, Sir Arthur Quiller-Couch, of Cambridge, reminds us, "examinations have a very respectable antiquity."

To advocate this retention is to cherish a tried procedure without in any sense denying the promise of the newer educational thought in which most of us have great faith. Extend the freedom of the newer doctrine to your younger children. But for students in your senior high schools and certainly for those who plan to go to college, afford the Regents test of their intellectual capacity and training. I believe that teachers and students in your senior high schools will cheerfully do their part in the examination experiment for a half century more.

RAYMOND WALTERS
SWARTHMORE COLLEGE

EDUCATIONAL EVENTS

THE INSTITUTE OF INTERNATIONAL STUDIES AT GENEVA

A REPORT of the Institute of International Studies (Institut Universitaire de Hautes Etudes Internationales) in Geneva is given in the *London Times Literary Supplement*. It is a center for the study of contemporary international questions in politics, law and political economy, entirely independent of the University of Geneva, and financed by annual grants from the Laura Spelman Rockefeller Memorial, from the Republic and Canton of Geneva, and from the Swiss Confederation. The executive council which administers the institute is composed of the following five members: M. Chuard (the Swiss Federal Councillor for Home Affairs), Mr. Vernon Kellogg (permanent secretary of the National Research Council at Washington), M. Osten Undén (professor at the University of Upsala), M. A. Oltramare (head of the department of public instruction in Geneva) and M. William Rappard (rector of the University of Geneva).

The institute offers facilities for advanced study of international problems to students who have already been prepared by previous studies in law, history and political economy. Courses are also held for young students who have not matriculated at the university and who intend to take up international questions. Geneva is a particularly favorable center for the observation of international institutions. With the help and direction of the institute students will be able to see and hear what elsewhere may only be gleaned from books, they will come into contact with people who are directly concerned with public affairs and will be able to attend the annual assembly of the League of Nations and of its grand council, as well as most of the council meetings of the League, the International Labor Conference, the meetings of the International Labor Organization and the frequent special international conferences, such as the Economic Conference of this year.

The personnel of the institute consists of a director, two professors and an assistant professor who will give twelve-monthly or six-monthly courses, allowing ample time to the students for personal study or for attending the university lectures. There is no intention of exhausting the whole teaching in one year or in a cycle of years. The aim will be rather for a student to study thoroughly some subject chosen with a view to elucidating some general problem, making as much use as possible of the documents and direct information available at the League of Nations.

M. Paul Mantoux, the director of the institute, has been for the last seven years director of the political section in the secretariat of the League of Nations. Before 1914 he held the chair of history at the University of London. As for the remainder of the staff, M. Eugene Borel is professor of international law at the University of Geneva and for several years was president of the Arbitral Mixed Anglo-German Tribunal; Mr. Eastman, who will be in charge of economic studies, is head of a section of the scientific division of the International Labor Office; M. Rappard, rector of the University of Geneva and since 1925 a member of the Commission for Mandates of the League of Nations, will lecture on the League of Nations. A number of distinguished persons have already promised their support, such as M. Loucheur (French

representative at the Economic Conference), Professor Schücking (professor to the Upper School of Commercial Science of Berlin), Professor Erich (Finnish ambassador to Berne), Professor Jäckh (professor at the Upper School of Politics of Berlin), Professor G. Scelle (professor in international law at the University of Dijon), M. Zimmern (assistant director of the International Institute of Intellectual Cooperation).

AMERICAN GERMAN STUDENT EXCHANGE FELLOWSHIPS

DR. CARL J. FRIEDRICH, executive director of the American German Student Exchange, has announced that the Exchange, at 2 West Forty-fifth Street, New York City, has received one hundred and sixty-six applications for fellowships to study in German universities during the next academic year. These came as a result of its announcements last autumn to American colleges and universities that these fellowships would be open again to American students. Twenty applicants have been selected.

The Exchange, which functions in cooperation with the Institute of International Education, is offering these German fellowships for the third year. The number of applications has increased each year as well as the number of fellowships available. The fellowships are an offering of mutual hospitality as the German universities entertain the American students as their guests, providing tuition, board and lodging, and in return American universities and colleges provide fellowships for young German scholars.

The twenty successful applicants are:

Frederick A. Baepler, of Kongsberg, N. D.; Boone M. Bowen, Mount Pleasant, S. C.; Leigh E. Chadwick, Washington; Abram E. Freeman, Roxbury, Mass.; Herbert N. Gourley, Madison, Ind.; Margaret Groben, Buffalo; Ernest W. Gross, New Rochelle; Albert E. Hadlock, Jr., Scarsdale; Edmund D. Haigler, Washington Court House, Ohio; George V. Hilldring, New York; Margaret Jeffrey, Hawthorne, N. J.; John F. King, Williamstown, Mass.; Leroy E. Loemker, Specht's Ferry, Iowa; William C. Maxwell, Goldsboro, N. C.; Lois Meier, Framingham, Mass.; Charles B. Robson, Davidson, N. C.; Albert W. Shumaker, Philadelphia; Charles J. Woodbridge, Princeton; Donald Woodbridge, New York, and John Wulff, New York.

SOME RESULTS OF EDUCATIONAL SURVEYS

RESULTS which have followed the adoption of recommendations made to city schools over the country by the Bureau of Education, Department of the Interior, following surveys of the various systems, are described in a statement prepared by the bureau recently.

Reorganization of curricula, reorganization of school boards, changes in methods of selecting board members and school officials, improvements in administrative affairs, institution of junior high-school programs, adoption of vocational departments, financing of building activity, and increased interest and confidence on the part of the citizens are included in the results reported by the school systems for which the bureau has made surveys.

Four recommendations made to the Swarthmore, Pa., schools in 1923 have been put into effect as follows:

> The first recommendation, that an auditorium and gymnasium be provided immediately, was so convincingly presented that it came first.
>
> The second recommendation, for closer supervision and coordination in the elementary grades, has been carefully observed.
>
> The third recommendation covered the high school and pointed out the need for a reorganization of the program of studies. The principal and the faculty worked on this problem last year and a new program was instituted in September.
>
> The fourth recommendation advised the establishment of a kindergarten. It is an accomplished fact.
>
> A survey is a program for action. The school administration so regards the Swarthmore survey, and it has proved of inestimable value in thinking and planning a progressive program for the schools. The survey is not only usable; it is being used.

Among the results reported by the schools of Charlottesville, Va., following a survey in 1925, is the employment of a supervisor for certain elementary grades. The school reports that it has increased the salaries of teachers and has been able to hold a much larger percentage of them from year to year.

A report from Wheeling, W. Va., on a survey made in 1921, reads:

> The survey has been of value to our school system in preparing the way for the following results:

A board of 21 members elected by wards and on a partisan ticket has been superseded by a board of five elected at large on a non-partisan basis.

All new elementary teachers are required to have a standard two-year normal course, whereas prior to 1921 high-school graduates were eligible without further training.

Manual training and home economics were extended and a vocational school established in 1926, all of the instructors of which receive one half their salary from the Smith-Hughes fund.

One new elementary school costing one half million dollars has been built and is conducted on the platoon plan.

A stadium seating 15,000 has been built on levy, as was the elementary school.

The course of instruction has been revised and an entire new series of text-books adopted.

The salaries of the teachers have been increased.

Extension classes have been maintained by the board since 1921, with instructors from West Virginia University and the University of Pittsburgh kept in residence here at times.

The office force of the board has been increased from three to seven persons, the clerk keeping an accurate account of all items and the business manager acting as the board's agent.

State legislation has been secured whereby the superintendent of schools makes all appointments, except the business manager, which office was created after the legislation was enacted.

The Wilmington, Del., schools, as a result of a survey in 1920, report the reorganization of the school board from a large body composed of ward representatives to a smaller board elected at large; the projection of a building program; and the establishment of a research department, with a director in charge.

AN ORGANIZED PROGRAM OF CHILD-CARING AND PROTECTIVE WORK

COUNTY-WIDE programs of social work reaching children living in isolated rural districts as well as city children have been developed in eighteen states, according to a report issued by the United States Children's Bureau. This report, written by Emma O. Lundberg, describes briefly the forms of organization and types of activities for the protection of children carried on in these states under the authority of special legislation or through the efforts of state agencies.

It is only within the past ten years that county-wide public programs of social work have been extensively developed. In many states the county is the unit for taxation, health, education and poor relief, and when the need for extending public protection to children needing special care throughout a state—on the farms and in the villages, as well as in the cities—became apparent, the county was the most convenient local unit. County programs in most instances have been stimulated and promoted by a state board or department of charities or welfare, and more or less close relationships between the state and local organizations have been maintained. This form of state activity is an indication of the changing theory of the function of the state department from that of a purely supervisory and law-enforcement authority to that of an agency which promotes the development of constructive service by public and private agencies in all parts of the state.

County organization for child care and protection means primarily the unification, or at least the coordination, in the county of the work undertaken by various public agencies for the care and protection of dependent, neglected, delinquent, physically handicapped and mentally defective, and the appointment of a board or an individual to be responsible for the welfare of these children. Sometimes health activities and enforcement of child labor and compulsory education laws are also united with the program for care of dependent, neglected and delinquent children, and the activities of private agencies are coordinated in some counties with those of the public agencies.

Adequate care of individuals in need should not be the only benefit of county organization. It should also lead to the development of broader programs of preventive work, having as their aim the lessening of dependency and delinquency.

The form of county organization found in different places is based largely on the kinds of public and private agencies found in the counties, and the character of the population. No two states have exactly the same background and there are also great differences between counties in the same state. Programs must be

continually adapted to local needs and local resources.

Although different methods are in use in different states, four general types of county organization are becoming evident. These are: A broad program of public-welfare and child-welfare work done on a state-wide plan, found in North Carolina, Minnesota, Missouri, Virginia and Alabama; a program of social work, promoted by the state department of welfare, but not according to a state-wide plan, in California, Georgia, North Dakota, Pennsylvania, South Dakota and West Virginia; the "Iowa plan," which is a coordination of public and private relief promoted by a state body, and the type, found in Arizona, Arkansas, Indiana, Michigan, New York and Ohio, which covers care and supervision of dependent, neglected, delinquent or defective children, with or without the cooperation of the state department.

THE SURVEY OF LAND-GRANT COLLEGES

THE survey of land-grant colleges to be begun next month by the Bureau of Education, with a view to "modernizing" the institutions along educational lines, will be the most comprehensive of its kind, according to a statement of Commissioner of Education John J. Tigert, made in connection with a resolution commending the proposed study recently adopted by the Association of Land-Grant Colleges and Universities and reported in the *U. S. Daily*.

The study was authorized in the appropriation bill for the Department of the Interior passed by the last congress. The total cost was limited to $117,000, and $61,000 was authorized for the first year.

The full text of the resolution made public by Dr. Tigert follows:

Resolved: That the Executive Committee of the American Association of Land-Grant Colleges and Universities hereby expresses its satisfaction at the provision made by Congress for a thorough survey of the work of the Land-Grant institutions. The desirability of such a survey has been recognized by the association for several years but until this action by Congress there seemed to be no procedure available which would guarantee a study that would be both comprehensive and sympathetic with the traditions and objectives of such institutions.

Charged as they are by federal and state laws and by the conditions which led to their establishment with a special and vital type of public service, they have evolved objectives and methods peculiar to themselves. Because we believe that a clear and full understanding of the history and spirit of these institutions will be of major value in this study and because of the fundamental and vital interest of the member institutions in this phase of the matter, we respectfully offer to the Bureau of Education the fullest cooperation of this association in the prosecution of the survey.

We are looking hopefully to the results of this study to aid these institutions in adjusting their procedure to the demands of contemporary times without violation of their fundamental purposes and objectives.

THE REGULATION OF EXTRACURRICULAR ACTIVITIES AT AMHERST

NEW measures in the regulation of extracurricular activities at Amherst College have been adopted by the students. The action was the result of agitation to change conditions so that the burden of the college positions did not fall on the shoulders of a few men to the detriment of their scholastic work and to the deprivation of other men who may have been equally qualified for the work.

The claim was made that an election to one office or active participation in sports was likely to push a man ahead on his popularity, often over men better fitted for the task. It was with the object of correcting this evil on the campus that the student council presented two plans for suitable limitation.

One plan, which was refused, provided for a point system whereby one man could not have more than six points, participation in each of the college activities counting so many points.

The plan adopted follows in detail:

No junior or senior shall be permitted to serve on more than one of the following organizations: Student council, committee of seven (the student body which governs the moral life of the college) and the honor system committee.

In the fall of the junior year the junior class shall elect the junior member of the honor committee, who may also be president of the class. This man shall serve as secretary of the committee that year and will automatically become the chairman of the committee his senior year.

In the spring of the junior year the junior class shall elect five men to membership on the Student Council. Later in the spring there shall be elected seven men to membership on the committee of seven. In the fall of the senior year two seniors shall be elected to serve on the honor committees along with the chairman of the committee previously chosen. These men shall be chosen according to the ruling in Section 1.

This does not limit a man's participation in three major sports. If the college believes that a man should be limited in the number of sports he may enter, they should pass a rule limiting it, but not link it with other college activities.

Amherst is not a large enough college in which to have such a rule, as it would be detrimental to the best interests of the sports. A man is presumably perfectly capable of participating in three sports so long as he is not burdened by too many other activities. Managers, editors, presidents of various organizations also will not be particularly burdened if limited to membership in one of the above groups.

THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY AND TUITION FEES

At a recent meeting of the corporation of the Massachusetts Institute of Technology, it was voted to raise tuition fees from $300 to $400.

In speaking of this move, President Samuel W. Stratton said:

The cost of education has been increasing in the last four or five years, while the tuition has remained stationary. The men we have on the faculty have stayed with us through loyalty more than anything else, considering that they could make much more outside, and the corporation feels that they should get a salary commensurate with that paid other works in the same field. This increase in tuition will go only part way in this, and in fact, if the institute were run as a business proposition, the tuition would be $500, as some on the corporation recommended.

We feel that the tuition should not be increased too much, and that a greater effort should be made to secure scholarships for the men who need financial aid. The corporation has favored turning part of the $400 back into a "loan fund" from which a needy student of good scholastic standing could borrow at a low rate of interest. This is expected to permit the "marginal student" to attend the institute, in spite of the increase in the cost of his education.

Horace S. Ford, bursar, made public the following figures concerning the cost of education at the institute: Average tuition now paid, $330, divided as follows: tuition, $300; average laboratory fee, $20, and student tax, $10. However, to this $330 the institute puts $460 additional, so that the actual operating cost per student is $790. Thus the institute pays out $1.40 for each dollar that the student pays in. The purpose of the new increased rate is to tend to equalize the load, to some extent, between the institute and the scholar.

The following is a comparison of tuition rates issued by the institute:

Brown	$350
Bryn Mawr	400
Cornell	300
Dartmouth	400
Harvard	300
Johns Hopkins	400
Lafayette	400
Mass. Inst. of Tech.	400
Pennsylvania	400
Princeton	400
Smith	400
Vassar	400
Wellesley	400
Williams	400
Yale	350

THE INSTITUTE OF CHEMISTRY OF THE AMERICAN CHEMICAL SOCIETY

The Institute of Chemistry of the American Chemical Society will be held from July 4 to 30 at the Pennsylvania State College, State College, Pa. The institute proper lasts from July 4 to 30. Courses for college credit extend from June 25 to August 5. The institute is a national affair, and students will be in attendance from all over the country. A section of new fraternity houses in one of the most attractive parts of State College has been taken over to house members of the institute and lecturers. Some of these houses are reserved for women, and others for married couples.

The committee in charge, consisting of N. E. Gordon, B. S. Hopkins, C. E. K. Mees, C. M. A. Stine, G. L. Wendt, F. C. Whitmore, W. R. Whitney and F. W. Willard, has arranged a program consisting of: A series of daily conferences, intensive courses of lectures carrying

college credit, evening talks on popular science subjects and exhibits and educational films.

In addition to the educational phases, the committee is arranging excursions, picnics, golf and tennis tournaments and other recreational features, such as dancing and horseback riding.

Many prominent chemists of America and Europe are on the staff of lecturers. Among them are Dr. Jean Piccard, of the University of Lausanne, Switzerland; Dr. Eric K. Rideal, lecturer in physical chemistry at the University of Cambridge, England; Dr. J. C. Drummond, lecturer in biological chemistry at the University College, London; Dr. Harry Holmes, head of the department of chemistry, Oberlin College; Dr. James Kendall, dean of the Graduate School, New York University; Dr. W. P. Davey, head of physical chemistry at the Pennsylvania State College; Dr. Emma Carr, head of the department of chemistry at Mount Holyoke; Professor Pauline G. Beery Mack, of the department of chemistry at the Pennsylvania State College; Dr. Charles P. Smyth, of Princeton University; Dr. E. D. Ries, head of the department of chemical engineering at the Pennsylvania State College; Dr. Marie Farnsworth, of the department of chemistry, New York University, formerly with the Bureau of Mines; Dr. C. H. Kunsman, of the Fixed Nitrogen Research Laboratory; Dr. L. H. Germer, of the Bell Telephone Laboratories, and Dr. L. Tonks, of the General Electric Research Laboratories. Professor Wilhelm Segerblom, head of the department of chemistry at the Phillips Exeter Academy, will have charge of the course in the teaching of chemistry.

Daily morning conferences will be held on arranged topics, such as economic factors in the chemical industry, the use of X-rays in research, control of corrosion, the training of chemists, at which Dr. Neil Gordon will preside, continuation education, catalysis, ammonia synthesis, microscopy, spectroscopy, nutrition, vitamins and so on. Papers will be presented lasting about 45 minutes, followed by open discussion and questions.

These conferences will be conducted by Dr. Hans Tropsch, assistant director of the Coal Research Institute at Mulheim-Ruhr, Germany; Victor Cofman, of the E. I. du Pont de Nemours & Co. research staff; Dr. Gerald Wendt, dean of the school of chemistry and physics, at the Pennsylvania State College; Dr. H. S. Taylor, chairman of the department of chemistry at Princeton University; John Teeple, consulting chemical engineer of New York City; Professor H. C. Sherman, of Columbia University; Dr. W. M. Clark, of the Hygienic Laboratory, U. S. Public Health Service; Dr. S. E. Sheppard, of the Eastman Kodak Co.; Dr. Rideal, Dr. Drummond, and other well-known leaders in chemical work.

DEPARTMENTAL PROGRAMS AT THE SEATTLE MEETING

THE meetings of departments and allied organizations in the National Education Association begin on Tuesday, July 5, the third day of the convention, and continue through Thursday, July 7. Included among them are those of the department of elementary school principals and those of the department of classroom teachers. Their programs follow:

Department of elementary school principals. The Tuesday meeting, President E. Ruth Pyrtle presiding: Greetings from President Francis G. Blair; Greetings from Joseph M. Gwinn, president of the department of superintendence and superintendent of schools, San Francisco; International Gossip, William F. Russell, dean, Teachers College, Columbia University, followed by discussion from the floor of concrete ways of applying principles of international goodwill in elementary education. The meeting will close with announcements of the committees on resolutions and nominations.

At the Wednesday meeting, Worth McClure, assistant superintendent of the Seattle schools, will preside. Anna Thompson, president of the department of classroom teachers, will bring greetings, followed by ten-minute speeches on "Cooperative Supervision," by Mrs. Susan M. Dorsey, superintendent of the Los Angeles schools; Elizabeth McCormick, principal of the Timothy O. Howe schools, Superior, Wis.; Grace M. Swan, supervisor of elementary education, Pittsburgh, Pa.; Cornelia S. Adair, junior high school teacher, Richmond, Va. M. E. Peterson, principal of Twentieth Street School, Los Angeles, will give the report of the Committee on Revision of By-laws.

President Pyrtle will preside at the third session, on Thursday, when the following committee reports will be given: Standards and Training of Elementary School Principals, W. T. Longshore, prin-

cipal, Greenwood School, Kansas City, Mo.; Resolutions; Nominations; Enrolment, Mrs. Jessie M. Fink, principal, Buchanan School, Grand Rapids, Mich.; Educational Progress, F. H. Duffy, principal, Harding Junior High School, Steubenville, Ohio; Report of secretary, Warren A. Roe, principal, Belmont Avenue School, Newark, N. J.; Report of treasurer, Courtland V. Davis, principal, Franklin School, Plainfield, N. J.; Report of president, E. Ruth Pyrtle, principal, McKinley School, Lincoln, Nebr. Following the program will be election of officers.

The annual dinner will be held at the Olympic Hotel on Tuesday, July 5, at 6:00 o'clock. Breakfast discussion meetings and committee reports open to all interested members will be held each morning at 7:30 A. M. at the Olympic Hotel: Monday, July 4, Enrolment Committee Report, Mrs. Jessie M. Fink, chairman, and Report on All-Year-Round Schools, Warren A. Roe, leader; Tuesday, July 5, Committee on Educational Progress, F. H. Duffy, chairman; Wednesday, July 6, Committee on Standards and Training, W. T. Longshore, chairman, and Thursday, July 7, Executive Committee meeting.

Department of classroom teachers. At the meeting on Tuesday there will be greetings from Mrs. Bertha K. Landes, mayor of Seattle, and Edith Post, president of the Seattle High School Teachers' League, followed by addresses by Augustus O. Thomas, president of the World Federation of Education Associations and state commissioner of education for Maine, on "The Social Aspect of Teachers"; three-minute speeches by classroom teachers on "Outstanding Benefits conferred upon Teachers by our Boards of Education"; "The Economic Welfare of Teachers," by Carl Croson, attorney-at-law and former member of Seattle Board of Education; "The Professional Welfare of Teachers," by Florence Hale, state agent for rural education for Maine. A committee on resolutions will be appointed.

Thursday afternoon will be a business session, with reports of the officers of the Committee on a Departmental Fee, Committee on Sectional Groups and the Committee on Resolutions, followed by the election of officers.

The annual dinner will be held Thursday, July 7, at 6 o'clock in the Olympic Hotel.

EDUCATIONAL NOTES AND NEWS

Arthur Stanley Pease, professor of Latin at Amherst College, has been elected president, to succeed George Daniel Olds.

Dr. Roscoe W. Thatcher, director of the New York State Agricultural Experiment Station at Geneva, and of the Cornell University Experiment Station at Ithaca, has been elected president of the Massachusetts Agricultural College. Dr. Thatcher succeeds Edward Morgan Lewis, who resigned recently in order to become president of the University of New Hampshire.

Dr. Alfred F. Hughes, president of Evansville College, Evansville, Ind., has been elected president of Hamline University, to succeed Dr. Samuel Kerfoot, who resigned in March. Dr. Hughes will assume his new work on July 1.

Dr. Homer P. Rainey, professor of education at the University of Oregon, has been elected president of Franklin College, Franklin, Ind. He will take up his new work in September.

Charles N. Herlihy, since 1922 supervisor of adult alien education in the Massachusetts State Department of Education, has been appointed principal of the Massachusetts State Normal School at Fitchburg, to succeed Principal William D. Parkinson.

At Rutgers University, Charles S. Crow, associate professor of education, has been made full professor, and A. S. Johnson, of the University of Wisconsin, has been made controller. Dr. Sumner C. Brooks, professor of physiology, has resigned to become professor of zoology in the University of California.

R. G. Guthrie, of the department of the principles of education at Ohio State University, has been made assistant professor of education at Marietta College.

Dr. Frank Tracy Carlton, professor of economics at De Pauw University, Greencastle, Ind., has been made professor of economics and head of the department at the Case School of Applied Science, Cleveland, Ohio.

Edmund E. Day, dean of the school of business administration and head of the department of political economy at the University of Michigan, has been appointed dean of administration. His work will involve a program of coordination for the various departments of the university. As he has been granted leave of absence for next year, he will begin his new work in 1928.

HENRY G. DOYLE has been named dean of men at George Washington University.

THE following have been added to the faculty of Birmingham-Southern College for the coming year: J. H. Coulliette, who is completing his work for the degree of Ph.D. at Columbia University, to be professor of physics; R. S. Poor, Ph.D., University of Illinois, to be associate professor of geology; Robert S. Whitehouse, graduate student at the Johns Hopkins University, to be associate professor of modern languages.

FRANK LORIMER, a graduate of Yale and Columbia Universities, has been appointed assistant professor in philosophy and psychology at Wells College, Aurora, N. Y.

DR. R. J. ANDERSON, chief of the division of biochemistry at the New York State Agricultural Experiment Station at Geneva, has resigned in order to pursue further investigations of the chemical properties of the tubercle bacillus at Yale University. Dr. Anderson has been elected professor of chemistry and will enter upon his new appointment about October 1.

PRESTON H. SMITH, superintendent of schools of Bayonne, N. J., has been reappointed for a term of five years, at an annual salary of $11,000.

HARRY L. FIDLER, a member of the Federal Board for Vocational Education, has been reappointed for a term of three years.

ROBERT B. LEE, of Belle Plaine, Iowa, has been chosen superintendent of schools at Rawlins, Wyo., to succeed George C. Bruton. Ernest D. Bloom, of Twin Falls, Idaho, has been elected superintendent at Kemmerer, Wyo., to succeed J. M. McDonald, who goes to Pocatello. A. A. Slade, of Casper, Wyo., succeeds J. C. Knode, superintendent at Laramie.

LAWRENCE W. RAKES has been appointed school superintendent for Sherman County, Oregon, to succeed A. M. Zevely.

JAMES W. D. SEYMOUR, director of publicity at Harvard University since 1923 and secretary of the Harvard Alumni Association, has resigned.

MISS MARY E. NICHOLS and Miss Margaret C. Brawley, of the Boston public schools, are retiring this month after fifty years of teaching.

DR. FRANK J. GOODNOW, president of the Johns Hopkins University, is to be awarded the honorary degree of doctor of laws by the University of Louvain, Belgium.

DR. FREDERICK B. ROBINSON, president of the College of the City of New York, has been awarded the honorary degree of doctor of laws by Manhattan College.

AT its commencement exercises on June 15, Brown University conferred the following degrees: doctor of science, upon Michael I. Pupin, professor of electromechanics at Columbia University; doctor of laws, upon William Louis Poteat, president of Wake Forest College, Wake Forest, N. C.; doctor of education, upon Edwin C. Broome, superintendent of schools in Philadelphia.

AT its commencement on June 13, Syracuse University conferred the honorary degree of doctor of laws upon James Sullivan, assistant commissioner of education of New York State and formerly state historian; Arlo Ayres Brown, president of the University of Chattanooga; James Brown Scott, president of the Institute of International Law.

PRESIDENT CHARLES L. BEACH, of the Connecticut Agricultural College, has been awarded the honorary degree of doctor of science, and President John Edgar Park, of Wheaton College, the honorary degree of doctor of laws and letters, by Wesleyan University.

DR. IRA A. FLINNER, education director of the Lake Placid Club Education Foundation, has been awarded the honorary degree of doctor of laws by Grove City College, Pa.

JOHN ERSKINE, professor of English literature at Columbia University, delivered the commencement address at Hobart College on June 13, and was awarded the honorary degree of doctor of literature.

DR. JOHN M. THOMAS, president of Rutgers University, gave the graduation address at Upsala College, East Orange, N. J., on June 14.

DR. JOHN H. FINLEY, of the editorial department of the New York *Times*, was the com-

mencement speaker at Wells College, Aurora, N. Y., on June 14.

BISHOP FRANCIS J. MCCONNELL, of Pittsburgh, Pa., formerly president of De Pauw University, delivered the commencement address at the Ohio State University, Columbus.

DR. JOSIAH H. PENNIMAN, provost of the University of Pennsylvania, has gone abroad for the summer. He is representing the university at the centenary celebration of the University of London, and at the five hundredth anniversary of the University of Louvain, Belgium.

FRANK KRAMER, head of the department of education at Gettysburg College, will spend the summer in Europe.

DR. CARTER V. GOOD, professor of education at Miami University, has been invited to assist in the preparation of the next yearbook of the National Society of College Teachers of Education. He will assume responsibility for the preparation of a selected and annotated bibliography on college teaching, the subject of the yearbook.

PROFESSOR C. A. SMITH, secretary of the faculty of the University of Wisconsin, has been elected president of the Wisconsin Association of College and University Registrars organized at a recent meeting of registrars in Madison.

PROFESSOR HENRY P. TALBOT, formerly chairman of the faculty and of the administrative committee of the Massachusetts Institute of Technology, has died, at the age of sixty-three years. He had been teaching chemistry at the institute for forty-two years.

THE annual convention of the Association of Cooperative Colleges met at Drexel Institute, Philadelphia, on June 23 and 24. Among the speakers scheduled were: J. W. Roe, of New York University; James E. McDaniel, of the Georgia School of Technology; Gustave M. Braune, of the University of North Carolina; D. C. Jackson, of the University of Louisville; George W. Burns, of the University of Cincinnati; Max B. Robinson, of Evansville College; W. H. Timbie, of the Massachusetts Institute of Technology; J. W. Hallock, of the University of Pittsburgh; W. D. Bliss, of Marquette University; Fred E. Ayer, of the University of Akron; David E. Porter, of New York University.

AN Adult Education Summer School, under auspices of the California State Department of Education, cooperating with other educational and social organizations, is to be held this summer at Mills College, Oakland. The course will be three weeks beginning on August 8 and closing on August 27. As planned, the maximum enrollment will be 150. Selection will be made from those who have special interests and are anxious to keep abreast of the latest matters pertaining to education. The school will be under the direction of Dr. Harry Overstreet, of the College of the City of New York. The members of the faculty will comprise Franz Boas, of Columbia University; Gordon Watkins, of the University of California; William Elliot, of Harvard University; Alexander Meiklejohn, of the University of Wisconsin; William McDougall, of Harvard University; Professor Jaederholm, of Sweden; L. S. Rowe, of the Pan-American Union. During the first week there will be discussed problems on assimilation of races; second week, economic and industrial development; third week, American social and political institutions.

THE celebration of the centenary of University College, London, began on June 23, and will continue until July 2.

PRINCETON UNIVERSITY has been given $250,000 by Thomas N. McCarter, of Newark, president of the Public Service Corporation of New Jersey, for the erection of a university theater.

YALE UNIVERSITY has received $100,000 from Howard Heinz, of Pittsburgh, to be added to the Yale Endowment Fund for the establishment of the Howard Heinz Students' Educational Fund, the income of which will be used as a revolving fund to assist Yale undergraduates and students in the postgraduate schools who have taken their undergraduate work at Yale. No interest will be charged upon the money advanced until the day the student graduates. Afterward, interest at the rate of four per cent. will begin and the student given ten years in which to repay the amount advanced.

AMHERST COLLEGE has been given $100,000 by Charles E. Merrill, of New York, for the aid of students who can not pay their way through college.

CORNELL UNIVERSITY has received a gift of $50,000 from Frank G. Talman, vice-president of the E. I. du Pont de Nemours and Company, to complete a fund of $200,000 for the establishment of a distinguished service professorship in the college of mechanical engineering as a memorial to the late Professor John E. Sweet.

BY action of the Legislature of the State, the income of the University of Michigan from the state mill tax has been raised from $3,700,000 per year to approximately $4,625,000. The Legislature removed the proviso in the mill tax bill whereby the proceeds of the tax were limited to the first figure stated. Another bill passed by the Legislature and approved by the governor makes special appropriations for land and buildings, including a model elementary school to be used for research and teaching purposes by the school of education.

THE Assembly of the State of Illinois has passed an enabling act appropriating $30,000 to the University of Illinois to establish a college of journalism.

IRVING W. BONBRIGHT, of Englewood, N. J., has given $100,000 to the Yale School of Music in memory of his brother, James Howard Bonbright, who died in 1887 while a student at Yale College.

CLARKSON COLLEGE OF TECHNOLOGY, at Potsdam, N. Y., has received gifts of $40,000 for an athletic field from Representative Bertrand H. Snell, of Potsdam, and Mrs. Snell, and over six hundred acres of land from Miss Anna Clarkson, niece of one of the founders. The tract comprises the old Clarkson estate, overlooking the valley from Clarkson Hill. The property is intended as the future site of the college.

FRED M. KIRBY, vice-president of the F. W. Woolworth Company, of Wilkes-Barre, Pa., has established a trust fund of more than $200,000 for a proposed health center as a memorial to his mother.

A STATEMENT issued by the bureau of education reports that there are now 722 platoon, or work-study-play schools, in 120 city systems and two county systems in thirty-four states in this country. The total population of the cities having this type of school organization is over 17,000,000. Of the 120 city school systems, thirty-four cities, having a total population of 6,000,000, operate all their schools on the platoon plan. The work-study-play organization is growing rapidly because of the solution which it offers for crowded conditions. Under the traditional plan the school of twenty-four rooms usually accommodates twenty-four classes, while under the platoon plan the same facilities would accommodate thirty-two classes, thus saving the erection of eight rooms, or thirty-three and one third per cent.

A THOUSAND new rural schools will be established in Mexico by the federal government during the coming year. In addition, 10 normal schools will be opened for the training of rural school teachers and 10 "cultural missions" will travel through certain sections to hold institutes. Each mission comprises a director, a teacher of agriculture, a social worker and a teacher of physical education, all of whom have completed a period of special training in preparation for their work. They remain four weeks at each location.

SPECIAL CORRESPONDENCE

GRADUATE SCHOOL OF THE U. S. DEPARTMENT OF AGRICULTURE

THE Graduate School of the United States Department of Agriculture first offered courses to the people of the department in 1921. It was established for the purpose of giving the workers of the department's staff opportunity to carry their training forward, in line with the department's work, in order that they might become more valuable to the department, the government and the country. Since the first year there has been a constantly increasing interest in the school on the part of the department personnel and a consequent widening of the school's scope.

"It may not be generally known that the Department of Agriculture has more scientific workers than all other branches of the government combined, and that it is the largest scien-

tific organization of its kind in the world," says Dr. A. F. Woods, director of scientific work of the department. The department's activities cover a great diversity of subjects, and the department has in it many of the world's leading specialists in their respective fields. At the same time, through the Civil Service, there are constantly coming into the government service graduates or younger workers, and it is the opportunity for the development of these workers that is provided in the graduate courses. The Department of Commerce makes similar provision for its scientific employees.

The Army and Navy have gone very much farther than the Departments of Agriculture and Commerce, not only encouraging their people to take advanced work in educational institutions, but frequently paying the entire expense of the course if the work is considered of value to the government. The Army War College is an educational institution of the first order, where advanced training is given to men in the military service as a part of their work. It is not too much to hope that the Department of Agriculture, and perhaps some other scientific branches of the government service, may in the future greatly increase the value and efficiency of their workers by some similar undertaking. Certainly the least that the department can do is to maintain its close contacts with educational institutions and promote the training of research workers in special fields through such contacts. This question was carefully discussed by members of committees present at a recent meeting.

At the present time, graduate work outside the department in educational institutions is allowable on a furlough basis, and can be done either on leave without pay or on annual leave. In case of investigators located at educational institutions for the conduct of special cooperative research, it is permissible, if the institution is willing, to grant graduate grade for such research work, if the student registers in the graduate school in order to receive credit. This does not involve the use of any part of official time for attendance at classes. Any other work carried on by such employees would have to be done outside of office hours or on leave without pay. It is also possible in cooperative work to utilize the services of graduate students who are qualified and who may be paid a limited amount for carrying on certain work in connection with approved cooperative projects. In these ways contacts are maintained between the department workers and the educational institutions, and these contacts are of great value to the Department of Agriculture, not only in the training of men for its work but in increasing the efficiency of the men.

At a recent meeting of the executive committee of the school a committee was appointed to arrange for departmental get-togethers, at which phases of the department's work will be presented by department experts, for the purpose of acquainting the workers generally with the lines of work in progress.

The work of the graduate school is conducted entirely outside of government office hours, but no student is expected to take more work than can be carried without crowding or burdening.

The use of the facilities of the Department of Agriculture is amply provided for by law, and is designed to increase the efficiency of the workers of the department and thus enhance their value to the government service.

A report on the finances of the school now shows a good balance in the treasury. The school is now practically self-supporting.

L. R. ENDER
U. S. DEPARTMENT OF AGRICULTURE

DISCUSSION

WHY DO COLLEGE STUDENTS STUDY?

AT a time when the contradictory accusations are made that the American student has no taste for books and that the college does not sufficiently encourage the undergraduate to follow his own intellectual bent, students' own analyses of their reasons for study may be of interest.

Under the direction of the Student Curriculum Committee of Vassar College, each student, after having kept track for the entire second semester, 1924–25, of the time spent on each of her courses, was asked to explain the actual expenditure of time. Table I summarizes the remarks of eighty-nine seniors—or one third of the class—who discriminated sufficiently to

designate their incentives for each course separately. These eighty-nine were slightly better students than their classmates. Since some answers were hastily written and some were ambiguous, and since, also, the students may have been mistaken as to their incentives, the figures must not be considered more than roughly accurate. The factors listed in the table are identical in wording and order with those suggested in the questionnaire.[1]

TABLE I

FREQUENCY WITH WHICH FACTORS AFFECTING TIME SPENT IN STUDY WERE DESIGNATED BY 89 SENIORS OF VASSAR COLLEGE, SECOND SEMESTER, 1924–5[2]

Factors which influenced time spent	Percentage of 373 cases[3] in which mentioned
Interest in the subject	60
Realization of the value of the work to you in the future	19
Amount assigned / Amount on which you expected to be checked up	56[4]
Difficulty of the subject	6
Desire for good marks	18
Desire of maintaining self-respect	12
Desire for instructors' respect	10

The intensity of each factor is not, of course, indicated, except that a certain intensity was necessary to cause recognition, with the result that frequency is a very rough measure of relative intensity. If the students may be trusted, the most influential factors are probably interest in the subject and the amount of work expected or necessary, with sense of future value and marks next but of considerably less importance. According to the students themselves, then, there is a fairly even balance between those incentives (requirements and marks) which indicate lack of intellectual independence and those more desirable ones (interest and value) which one would expect to find predominant in the adult scholar.

KATHERINE H. POLLAK

[1] A suggestion concerned with methods of teaching has been omitted.

[2] This table does not mean that in all cases where designated the factors were present and therefore increasing the number of hours spent. The opposite was true to at least the extent shown by the following figures. These cases are included in Table I. Lack of interest, 4 per cent.; lack of sense of value, 1 per cent.; little assigned or checked up, 11 per cent.; easiness of subject, 2 per cent.

[3] A "case" is here a student's analysis of her incentives in a specific course. Since the average student took over four courses, there are over four times as many cases as students.

[4] This figure is somewhat greater than it should be because of slight duplication.

QUOTATIONS

THE IMPERIAL EDUCATION CONFERENCE

THE third Imperial Education Conference will open on June 20, and will be attended by the Prince of Wales. The first of these conferences was held in 1911, and the intention was to have similar conferences at intervals of four years, but the war intervened and the second conference was not held until 1923. The forthcoming conference will be on a more substantial scale than its predecessors, and special weight is to be laid on the difficult educational problems of tropical regions. There will be in all some seventy delegates from oversea, and each of the dominions will be represented by some of its leading experts. The local education authorities of this country and the teaching profession will be represented at the more important meetings, but the conference will be closed to the public and the press. This innovation is made presumably in order to allow of the freest speaking on questions of common interest. The meetings will extend over three weeks, and after the formal discussions are ended the delegates will visit various places of educational interest, including Oxford and Cambridge. It is certainly desirable that these delegates, drawn from every part of the empire, should see in some detail the work now being done in the various grades of education in the country. No doubt there are advantages attaching to a conference with closed meetings, and public interest in a gathering which largely depends for the effective results of its labors on the support of the public will be sustained if adequate official reports of the meetings are issued.

The subjects to be discussed are adolescent

education, new ideas and developments in education (including the teaching of empire history and geography), rural education, and the special problems of tropical or subtropical countries supporting more than one race. It will be noticed that the agenda, so far as the advisory committee has thought fit to disclose it, does not deal with the subject of emigration of young persons of school age. It might be thought that the subject is second to none, so far as imperial interests are concerned, in its importance to the great dominions. The need of a steady flow of immigrants is brought constantly to the notice of the public throughout the empire, and this conference, it might be thought, would be anxious to discuss the ways and means of continuing the education of adolescents who have felt the call of this or that great dominion. No doubt the matter will occupy the minds of the delegates. Indeed it is implicit in some sense in the questions that are to be discussed. The recent report of the Consultative Committee on Adolescent Education will, no doubt, be in the hands of the delegates, and the home authorities are apparently anxious to learn how far the dominions are in agreement with the system of universal secondary education of various grades after the age of eleven which is advocated by the Consultative Committee. If Australia or New Zealand or Canada can point to post-primary schools of the type indicated by the committee, this will be a substantial inducement for parents to take part in emigration schemes that comprise a definite system of oversea education for adolescents.

Then again there is the question of rural education. In this country we are beginning to organize that field of education, and to see that if the drift to the towns is to be stopped, if the call to the country and to the empire overseas is to be stimulated, rural education must be made in its post-primary form more interesting and more capable of being an organic part of a later vocational education related to one or more of the special aspects of agricultural life. No doubt in the dual system we have our difficulties here, but in fact some of these difficulties have been faced and solved in Canada, where the religious question in education is not less insistent than in England and Wales. It is essential from the point of view of the dominions that intending immigrants should have reached some stage, even if it be only the first stage, of an education that is to have an agricultural vocational bias. If the dominions can point to a system of rural education that can fit into the English system and is intended to produce practical workers in the region of rural economy, much advance will be made. Coordination between British and oversea education is the goal to be aimed at, and the coming conference may well do something substantial to secure more living contact. One of the great difficulties is the variety of teachers' qualifications, salary scales and superannuation schemes in the various parts of the empire. The official memorandum frankly states that these differences and the absence of reciprocal arrangements "tend to hinder the movement of teachers from one part of the empire to another, and this impedes the development of cultural unity." It is difficult to know what the phrase "cultural unity" means, but if it means organic unity between the various educational systems within the empire, then the official hope that some agreement may be reached is important. The Education Act, 1921, supplies some of the needed machinery for securing organic unity, and the dominions can, no doubt, supply further machinery if encouragement is offered by the imperial government.—*The London Times Educational Supplement.*

BOOKS AND LITERATURE

EUROPEAN SECONDARY SCHOOL TEXT-BOOKS ON BIOLOGY AND EVOLUTION

THE schoolmen of Europe have not adopted the term "biology" as a suitable name for the course offered in their secondary schools, but we find a course similar in many details to ours under the designation of "histoire naturelle."

In October, 1918, a revision of the plan of study in the new republic of Czecho-Slovakia went into effect. The curriculum, as outlined in L'Enseignement Secondaire dans la Republique Tchécoslovaque par Josef Hendrich et Mikulaš Šmok, presents six courses of study eight years in length which correspond in gen-

eral to a combination of our junior and senior high schools. There are also two reformed real, or gymnasium schools, and one Lycée de Jeunes Filles. In each of these nine courses of study religion is taught. Chemistry, physics and natural history are required in all. One of the main distinctions is in the Latin and Greek requirements. Greek is stipulated in but two of the eight, while Latin is found in six of the courses.

The amount of time given to some of these subjects seems much greater than in America, but prepared lessons are not usually assumed and the classes do not meet every day. Natural history is taught in six of the eight years in most of the courses, but there are not more than two recitations a week. The more usual arrangement is to give this work in the first two years (lower high school) and in the last four (upper high school). Our biology courses in America are in the last year of the grammar school or the first year of the high school. The actual time spent on natural history during the six years is equivalent to twelve recitations weekly for one year, as contrasted with five meetings per week for one year in America. In a very few schools we have an advanced course in biology that is similar to the work of the upper high school work in natural history. No distinction is made in the name of the course in Czecho-Slovakia, but we find on the title page a statement that the book is for the lower or upper high schools.

This course in natural history is similar in France, Switzerland and in Czecho-Slovakia. It consists of a study of botany, zoology, human physiology and hygiene, geology and mineralogy. All these topics may be included in a single book or there may be separate texts for each.

Others may be interested, as I have been, to see how European countries are meeting the question of the teaching of evolution. During the past summer I secured some of the biology texts that are being used in the schools of France, Switzerland, and, through the kindness of Madame Kosé, seven of the biologies used in Czecho-Slovakia.

Caustier's "Sciences Naturelles" has been and still is widely used in France. My copy bears the imprint of the eighth edition and was published in 1924. There is a general introduction to the biology of cells and tissues, followed by a special study of the functions of man covering 347 pages. The third section considers the principal types of organization in the animal kingdom and gives but 88 pages, while the fourth part on the anatomy and physiology of plants has 259 pages. The final summary of 27 pages of the book takes up the general ideas of evolution of plants and animals. This section has: (1) the evolution of the vegetable world where the sequence of thallophytes, mosses, cryptogams and angiosperms is simply stated. The discussion of species begins with the fixed idea of Linné and takes up hybrids and races with variation, adaptation, selection and mutation. (2) Evolution of animal world beginning with the geological history of animal sequences. Organic progress is continuous and is explained under (a) size—such as when a group of animals appear, the size is relatively small; (b) movement—the place of movement takes on more and more importance; (c) intelligence—which is evolved in the same manner as movement, *i.e.*, there has been a gradual development. This is followed by a discussion of the causes of variation and the idea of evolution.

The second text is by Langlebert, "Histoire Naturelle," 74th edition—1916. This popular book of the Swiss schools begins with a discussion similar to the above, followed by a section devoted to the study of man. It does not place as much emphasis upon the biology of man, but two hundred pages are devoted to it. The next section is given over to zoology, with seventy-three pages. This is followed by two hundred pages on botany. In both of these books there is this noticeable emphasis upon botany. The next section is headed geology and is given more emphasis than the part set aside for zoology, for here we have ninety pages. The final section of the book gives seventy-six pages to hygiene.

It is in the section devoted to geology that the subject of evolution is presented. Immediately preceding the topic of evolution, there is an account of the origin of quaternary man and the caverns of France and Spain. The several characteristics of man, such as his intelligence, the faculty of speech, his form, gives

him a supreme place in creation. Under the theories of evolution and transformation the discussion begins with the theories of Darwin and takes up the transition of great groups, the transitions in species, the causes of variation, etc. Then there is a section dealing with anthropology, where the remains of early man are described.

These two texts face without apology the subject of the origin of man and the theory of evolution. It is noticeable that there is very little of the philosophical aspect of evolution, but a simple presentation of the subject of variation, heredity and selection.

These two texts are in interesting contrast with the seven biologies which are used in the new republic of Czecho-Slovakia. Three of these are used in what roughly corresponds to the American junior high school. Two of these are designed for the lower classes of the high schools of Bohemia and one for Slovakia. These books have all been printed since 1921; one is a new book, one is in the second edition and one in the tenth. In none of these three is the subject of evolution or heredity mentioned. No reference is made to any of the evolutionary writers. These books are all fully illustrated and deal with the natural history of the more common animals. One begins with the domestic dog, and two begin with the monkey and proceed backwards to the simpler forms of animal life. Dr. Polivka's book, which is in the tenth edition with the latest printing in 1924, has a picture of the gorilla on the first page, but he does not mention man as having any relation to this group. Some very attractive colored plates are found in this book. There is one text for the upper high school, which represents a more advanced course but is similar to the others, except that it goes more deeply into anatomy. This text likewise does not deal with the subject of evolution. In the final page, reference is made to Pithecanthropus erectus, which is said to be similar to the first appearance of man.

The biology printed in the German language is "Naturgeschichte des Tierreiches" for the under classes, which is a natural history book that begins with the common house cat and passes over to a consideration of the apes, with pictures of the several kinds of apes, but there is no presentation of the relation of man to animals. In the second text, "Lehrbuch der Zoologie," by Dr. Brehm, on page 8 there is a discussion of embryological processes of preformation and epigenesis. Here the contributions of Wolff and Weismann are briefly presented, as well as the developmental theories of Roux. The material and method of this book corresponds more closely to some of our college biologies, but it is noticeable that here there is no reference to the general theories of evolution. Dr. Danek's "Zoology for Normal Schools" is in the Czecho-Slovakian language and is devoted entirely to zoology. This is a book for teachers and takes up both the natural history and anatomy of animals and man and would be ranked with our college texts. There are 250 pages in this text with about ten pages devoted to the theories of evolution and the arguments in support of this view.

His account of evolution begins with Linné, whose idea was that species were fixed, and that there are to-day as many species as there were in ancient times; he believed in what is known as special creation. This conception of species prevailed for a long time, but at the beginning of the nineteenth century St. Hilaire and Lamarck presented a different view. Lamarck held the view that higher forms of life developed from the lower. Cuvier strongly opposed this new interpretation and supported the views of Linné. A brief reference to the ideas of Cuvier in relation to fossils and catastrophes follows. The work of Lyell is cited showing that catastrophes have nothing to do with the development of the earth, but by examining the strata of the rocks he found that they are laid one on the other in a definite order, and that this plan or arrangement took place gradually. The strata, Lyell held, shows that there was a change in the petrified animals from lower to higher forms. The next development was the idea of Darwin, in presenting natural selection, which differs from the idea of Lamarck. The works of Haeckel and of DeVries are included, so that in this text there is the same freedom to present the subject of evolution as is enjoyed in American college books.

There is a noticeable contrast between the ideas of what shall be included in the secondary

schools. In France and Switzerland a frank facing of the subject of evolution is presented. In this new republic of Czecho-Slovakia, unhampered by tradition, we would think, there is a complete ignoring in the secondary schools of the topic of evolution. It is possible that this seeming omission is due to my not having access to the books that treat of geology, but at any rate the contrast is striking when compared with American biology texts.

In Czecho-Slovakia religion is given as much time as natural history and must be taught whenever there is a demand by the parents, so that each sect may be numerous enough to secure teaching in their respective beliefs. One is permitted to wonder whether this may not explain the omission of evolution from these several recent books.

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DANGERS INCIDENT TO THE CONTINUAL LENGTHENING OF PROFESSIONAL CURRICULA

IN 1825 the engineering curriculum of the Rensselaer Polytechnic Institute consisted of one year's work divided into three terms. There was provision for experimentation, observation, instruction and practice. At the celebration of the one-hundredth anniversary of the founding of this institution announcement was made of a five-year course leading to the master's degree and also of the opportunity for even more extended study.

From the 1860 catalog of the medical school of the University of Vermont, when my father matriculated, it is noted that the "next annual courses of lectures will commence . . . the twenty-eighth of February and will be continued until June fifth" of the same year, a period of fourteen weeks. It also states that the degree will be conferred after the candidate has attended two full courses of lectures, studied three years with a regular physician, attained the age of twenty-one years and prepared a thesis upon some subject connected with the science of medicine. Contrast this period of preparation for the practice of medicine, of about the time of the Civil War, with the present! Changes as striking as indicated by these two illustrations have occurred in all the professions.

In the normal course of events extension of the period of education for the professions was to have been expected. With ever-expanding areas of knowledge, with techniques becoming more and more complicated and involved, and with insistent urge for specialization, no period of professional preparation is too long—in fact, a whole lifetime is too short!

By some strange circumstance merit and even progress in this country have become associated with increased size, height and extensiveness. It is noticeable in every phase of current life. Occasionally the hazards involved in such continual expansions are called sharply to our attention. At the moment city engineers are beginning to realize that the height of buildings is a matter of grave public concern. It now seems perfectly clear that there is a limit to height which can not be exceeded without giving rise to a whole train of problems involving entrance and egress of tenants, reaching the upper floors without taking too much space for elevators and planning the structure so as not to unduly restrict natural light from the neighboring streets. The mere segregation of twenty thousand workers in one of these modern buildings so congests highways that "an automobile may not be more efficient than an ox-cart, and a passenger may often save time by leaving his chauffeur to run the car while he proceeds on foot."

In like manner the period of preparation for a profession can not be considered alone, merely on the basis of the amount of time necessary to master knowledge and perfect techniques. Associated with it are such primal considerations as cost, length of career, supply and demand, remuneration and curriculum pattern favorable to continued growth. The law of diminishing returns operates in education as in the height of buildings.

Our purposes will be served by a brief characterization of the important aspects of education for medicine, law, dentistry, theology, pharmacy, engineering and nursing. Limitations of time and space prevent portrayal of the range of variations and also of the mass of

material which completely justifies the summarizing statements as well as the deductions. While many years of intensive study would be required to accumulate and interpret the data from which authoritative and final conclusions might be drawn, something may be gained by now making available the results of studies extending over the past three years. The appended tables trace by decades changes in entrance requirements, length of school training, number of practitioners in each of the professions, population per member of profession, number of schools in each profession, number of students enrolled in professional schools, number of graduates from the schools of each profession, average enrollment in the schools of each profession, number of population per graduate in each profession, estimated turnover in each of the professions and estimated percentage of turnover supplied by the graduates from schools. For the careful formulation of these tables I am indebted to Dr. Lester W. Bartlett, now director of research, Y. M. C. A. College, Chicago.

The following series of brief statements include the important changes in the educational programs for each profession under consideration.

MEDICAL EDUCATION

Entrance requirements have increased from one year of high school or less in 1900 to two years of college in 1925, a total increase of five years.

Length of course has increased from two sessions of lectures, sixteen to twenty weeks each in 1870, to four full years in addition to the period of internship.

Curriculum has shifted from a supplement to apprenticeship to the full-time, pre-service type. There is no definite recognition of levels; *i.e.*, general practitioner, specialist, research worker.

Number of persons per physician has increased from 576 in 1900 to 729 in 1920.

Number of professional schools has decreased from 151 in 1900 to 77 in 1920. (The latter figure does not include border-line schools of the semi-professional type, which are very rapidly increasing.)

Number of students in medical schools has decreased from 25,000 in 1900 to 14,000 in 1920. In 1920 there were about as many students in medical schools as in 1890 in spite of the fact that the population has doubled in this period. (Enrollment does not include schools of the semi-professional type.)

Cost to the student, for tuition, has increased four times from 1910 to 1922, from an average of $500 to $2,000 (5 institutions).

For every ten practitioners at present medical schools are preparing between five and six successors (excluding schools of the semi-professional type).

LEGAL EDUCATION

Entrance requirements have increased from nothing or grammar school specified in 1870 to a range from completion of high school or less (65 per cent.) to two years of college or more (22 per cent.) in 1920. (Wide variation is due to the existence of schools of the proprietary type and to night classes conducted by religious organizations.)

Length of course has increased from a range of one year (25 per cent.) to two years (75 per cent.) in 1870 to an average of three full years in 1920, with wide variations.

Curriculum has shifted from a supplement to apprenticeship to the full-time, pre-service type. There is no definite recognition of levels; *i.e.*, law clerk, general practitioner, specialist, jurist.

Number of persons per lawyer has increased from 664 in 1900 to 863 in 1920.

Number of professional schools has increased from 96 in 1900 to 107 in 1920.

Number of students in law schools has increased from 12,000 in 1900 to 21,000 in 1920 with 40,000 estimated in 1925.

For every ten practitioners at present, law schools are preparing between ten and eleven successors.

DENTAL EDUCATION

Entrance requirements have increased from the rudiments of an elementary education or admission to high school in 1890 to one year in college in 1920, an increase of five years.

Length of course has increased from one year

TABLE I

ENTRANCE REQUIREMENTS TO PROFESSIONAL SCHOOLS

Profession	1870	1890	1900	1910	1920
Medicine			Less than H.S., –20 per cent.* 1 yr. H. S., – 60 per cent. More than 1 yr. H. S. and less than college, 13 per cent. Some college, .7 per cent.	High School or less, 82 per cent. 1 yr. college, 6 per cent. 2 yrs. college or more, 12 per cent.	2 yrs. college or more, 92.6 per cent. (1923)
Law	None or grammar school (Columbia first to prescribe entrance requirement — "good academic education")	No entrance requirement, 70.5 per cent. Grammar school, 18 per cent. Some as admission to college, 7 per cent.	Grammar school or equiv., 58 per cent. High school less than graduation, 36 per cent. High school or more, 5.8 per cent.	High School or less, 72 per cent. 1 yr. college, 9 per cent. 2 or more yrs. of college, 19 per cent.	High School or less, 62 per cent. 1 yr. college, 15.5 per cent. 2 or more years of college, 22.5 per cent.
Dentistry	None	Rudiments of elementary education or equivalent to admission to high school	One year of high school	Graduation from high school	1 year approved work in college
Theology (Protestant)			Common school or none, 28 per cent. Some high school training, 16 per cent. Some college work, 56 per cent.		980 schools selected at random High Sch. grad. or less, 18 per cent. High Sch. grad. or certification from ecclesiastical body for diploma, 40 per cent. 1, 2 or 3 yrs. of college, 8 per cent. College grad. for entrance leading to B.D. degree, 71 per cent.
Pharmacy	None	Grad. from standard H. S. (U. of Mich.) Correct use of English language (College of Pharmacy, New York)	Grad. from H. S. and 1 yr. experience (Mich.) Efficiency in arith. (College of Pharmacy, New York)	H. S. diploma (Mich.) 1 yr. H. S. (College of Pharmacy, N. Y.)	High school graduation (1923)

* This means that 20 per cent. of the schools admitted students on basis of the requirements stated.

TABLE I—Continued

ENTRANCE REQUIREMENTS TO PROFESSIONAL SCHOOLS

Engineering (degree granting)	Examination in elementary subjects or grammar school	None or indefinite, –4 per cent. 1 yr. high school, 17 per cent. 2 yrs. high school, 51 per cent. 3 yrs. high school, 24 per cent. 4 yrs. high school, 4.1 per cent. Above high school, 1.1 per cent.		High school graduation, 100 per cent.
Nursing		Grammar school or equivalent	High School or equivalent, 40 per cent. 1 yr. high school, 21 per cent. Grammar school, 31.7 per cent.	Grammar school, 12 per cent. 1 yr. high school, 42.7 per cent. 2 yrs. high school, 16.5 per cent. High school, 28 per cent.

of 16 weeks prior to 1870 to four full years.

Curriculum is of the full-time, pre-service type. There is no recognition of levels; *i.e.*, general practitioner, specialists, research dentist.

Number of persons per dentist has decreased from 2,500 in 1900 to 1,800 in 1920.

Number of professional schools has decreased from 54 in 1900 to 40 in 1920.

Number of students has increased from 8,000 in 1900 to 9,000 in 1920.

For every ten practitioners at present, dental schools are preparing between eight and nine successors.

THEOLOGICAL EDUCATION

Entrance requirements in 1900 varied widely from common school to some work in college. In 1920 standard schools required completion of a college course for entrance.

Course now is about the same length as in 1870. (Chief difference is noted above under entrance requirements.)

Curriculum is of the full-time, pre-service type. There is no recognition of levels; *i.e.*, minister, religious educational worker, missionary, college teacher.

Number of persons per clergyman has increased from 681 in 1900 to 830 in 1920.

Number of professional schools has increased from 154 in 1900 to 185 in 1920.

Number of students has decreased from 8,000 in 1900 to 7,000 in 1920.

For every ten clergymen now practicing, theological schools are educating between one and two successors. (This is not a new condition. The highest ratio was .47 in 1900.)

PHARMACEUTICAL EDUCATION

Entrance requirements in 1890 ranged from correct use of English language to graduation from high school (one institution). In 1920, high school graduation was practically a universal requirement.

Length of the course in 1870 in independent schools was one year of five months in evening lectures to supplement apprenticeship and in university schools about double. The course

in 1920, in independent schools, was two years for graduate in pharmacy, and in university schools four years for a professional degree, and two to three years for a diploma.

Curriculum has shifted from a supplement to apprenticeship to the full-time pre-service type. There is a slight recognition of levels.

Number of schools in 1920 was about the same as in 1900, with a sharp rise and equally sharp decline in the intervening decades.

Number of students has increased from 4,000 in 1900 to 5,000 in 1920.

ENGINEERING EDUCATION

Entrance requirements have increased from the range of examination in elementary subjects and graduation from grammar school in 1870, to high school graduation in 1920, an increase of four years.

Length of course has increased from one year prior to 1850, then to three, then four. In 1920 the standard course was four years, with a few instances of a more extended period.

Curriculum has shifted from a supplement to apprenticeship to the full-time pre-service type. There is one outstanding illustration as well as several minor examples of the cooperative type. There is no widespread recognition of levels; *i.e.*, contractor, draughtsman, engineer and consulting engineer, although there is general recognition of specialization as between mining, electrical, mechanical engineering, etc.

Number of persons per engineer has decreased from 6,000 in 1880 to 1,500 in 1890, to 850 in 1900, and to 773 in 1920.

Number of students in engineering schools has increased from 12,000 in 1900 to 50,000 in 1920.

NURSING EDUCATION

Entrance requirements have changed from graduation from grammar school in 1900 to a range from this point to high school graduation. About 30 per cent. require high school graduation; 16 per cent., two years of high school; 42 per cent., one year of high school; and 12 per cent., grammar school only.

Length of course has changed from a range of two to three years in 1910, to a range of two to six years in 1920 (proposals now being entertained for a brief course).

Curriculum has retained its original pattern of instruction and practical work. There is a distinct recognition of some levels; *i.e.*, nurse, public health nurse, superintendent of nurses training school.

Number of schools has increased from 432 in 1900 to 1,755 in 1920.

Number of persons per nurse has decreased from 3,000 in 1880 to 600 in 1900 and about 350 in 1920.

The following table will facilitate comparison of the outstanding changes from the period of 1900 to 1920.

SUMMARY OF IMPORTANT CHANGES IN PROFESSIONAL EDUCATION, 1900 TO 1925
(The most significant single statement that may be made under each heading)

	Entrance requirements	Length of courses	Type of course	Levels	Persons per service	No. of schools	No. of students	Ratio of successors
Medicine	+5 yrs.	+3 yrs.	S.A.[1]	no	+150[2]	− 50	−11,000	5 to 10[3]
Law	+4 yrs.	+1 yr.	S.A.	no	+200	+ 11	+ 9,000	11 to 10
Dentistry	+5 yrs.	+4 yrs.	S.A.	no	−700	− 14	+ 1,000	8 to 10
Theology	+4 yrs.	same	same	no	+150	+ 31	− 1,000	2 to 10
Pharmacy	+4 yrs.	+1 yr.	S.A.	yes	.....	same	− 1,000	plus[4]
Engineering	+4 yrs.	+2 yrs.	S.A.	no	− 70	.....	+38,000	plus
Nursing	+2 yrs.	+2 yrs.	same	yes	−250	+1323	+43,000	plus

[1] Supplants apprenticeship.

[2] Plus means that more persons must now be served by practitioner than formerly. Minus means that the service is more adequate, quantitatively than formerly.

[3] Five successors being educated for each ten present practitioners.

[4] Exact information not available due to changes in classification, but indications are that the number of successors will exceed the number of present practitioners.

Number of students enrolled has increased from 11,000 in 1900 to 54,000 in 1920.

A composite picture of the changes would indicate:

(1) An average increase of four years in entrance requirements.
(2) An average increase of two years in the length of the course.
(3) A curriculum of the full-time, pre-service type, supplanting apprenticeship.
(4) No recognition of levels in five of the seven fields; some recognition in pharmacy and nursing.
(5) (a) Less adequate provisions, quantitatively, for professional service now than formerly in medicine, law and theology.
(b) More adequate provision, quantitatively, for professional services now than formerly in dentistry, engineering, and nursing.
(6) An increase in number of training institutions in all but medicine and dentistry.
(7) A great decrease in number of students in medicine, an astonishing increase in number of students in engineering and nursing, and slight shifts in dentistry, theology and pharmacy.
(8) In medicine and theology the number of educated successors to present practitioners will be significantly less, the number of dentists about the same, and the number of lawyers, pharmacists, engineers and nurses significantly greater.

The key difficulties which must be faced are due to (a) the increased length of professional courses with no reference to levels, and (b) the prevalence of pre-service education to the exclusion of post-service facilities, for continuing the education of practitioners. There are correlative difficulties which must be met, such as the increased cost of professional education to students, in terms of both time and money; the diminishing number of students under preparation in such important callings as medi-

TABLE II

LENGTH OF SCHOOL TRAINING FOR THE PROFESSIONS

	1870	1890	1900
Medicine	Two sessions of lectures, 16 to 20 weeks each, supplementing apprenticeship		(1899) 4 years—91 per cent. 3 years—6 per cent. Less than 3 yrs.—3 per cent.
Law	(1860) 2 years, 25 per cent. 1 year, 75 per cent. Supplementing law office experience	3 years—25 per cent. 2 years—61 per cent. 1 year—13 per cent. (61 schools)	3 years—51 per cent. Less than 3 yrs.—43 per cent. Average length—7 mos.
Dentistry	Prior to 1870 1 year of 16 weeks after grammar school	2 yrs. (1870–1891) of 16 to 20 weeks after grammar school	3 yrs. (1891–99) of 20 to 24 weeks 3 years (1899–1903) of 28 weeks after one year high school
Theology (Protestant)	General practice 3 years		(1899) 4 years—24 per cent. 3 years—70 per cent. Less than 3 years—4 per cent. Av. length of year—8 mos.
Pharmacy	a. In independent college—1 year of 5 mos., lectures evenings, to supplement apprenticeship b. In university school 1–2 yrs. repeated lectures—5 months' year	a. 2 yrs. lectures 5 months each, 30 hours per week b. 2 years—pharmaceutical chemist	a. 2 yrs. of 27 weeks each; 3 days per week b. 2 years—pharmaceutical chemist. 4 yrs.—B.S. in pharmacy
Engineering	3 years leading to degree or diploma		4 years leading to B.S. degree
Nursing			

TABLE II—Continued

LENGTH OF SCHOOL TRAINING FOR THE PROFESSIONS

	1910	1920
Medicine	4 yrs. required of all, of which 12 per cent. had prerequisite of at least 2 yrs. college; 6 per cent., one yr. of college; 82 per cent., high school or less. (136 schools)	4 yrs. or more required of all, of which 88 per cent. had prerequisite of 2 yrs. college or more. 10 schools required 1 yr. of interneship.
Law	Per cent. full time schools (64) 3 yr. college + 3 yr. law 8 per cent. 2 yr. " + 3 yr. law 5 per cent. 2 yr. " + 2 yr. law 3 per cent. 1 yr. " + 3 yr. law 5 per cent. 0 yr. " + 3 yr. law 48 per cent. 0 yr. " + 2 yr. law 28 per cent. 0 yr. " + 1 yr. law—1 school Per cent. part time schools (49) 2 yrs. college + 4 yr. law — 2 yrs. " + 3 yr. law — 1 yr. " + 3 yr. law — 0 yr. " + 4 yr. law 6 per cent. 0 yr. " + 3 yr. law 59 per cent. 0 yr. " + 2 yr. law 33 per cent. 0 yr. " + 1 yr. law—1 school	Per cent. full time schools (76) 3 yr. college + 3 yr. law 11 per cent. 2 yr. " + 3 yr. law 71 per cent. 2 yr. " + 2 yr. law — 1 yr. " + 3 yr. law 7 per cent. 0 yr. " + 3 yr. law 7 per cent. 0 yr. " + 2 yr. law — 0 yr. " + 1 yr. law—1 school Per cent. part time schools (74) 2 yr. college + 4 yr. law 7 per cent. 2 yr. " + 3 yr. law 5 per cent. 1 yr. " + 3 yr. law 12 per cent. 0 yr. " + 4 yr. law 46 per cent. 0 yr. " + 3 yr. law 20 per cent. 0 yr. " + 2 yr. law 10 per cent.
Dentistry	3 yrs. of 32 weeks after 3 yrs. high school (See U. S. Bureau of Education. Bulletin 1925, 39: Progress of Dental Education)	4 years of 32 weeks after 4 years high school (1924), 4 yrs. after 1 yr. of college)
Theology (Protestant)		4 years—12 per cent. 3 years—83 per cent. 2 years— 5 per cent. (105 schools examined)
Pharmacy	a. 2 yrs. 30 weeks, 3 days each, for graduate in pharmacy; 4 yrs. for pharmaceutical chemist b. As in 1910. Graduate courses added	a. 2 yrs. of 32 weeks each on alternate days for degree of graduate in pharmacy 3 yrs.—pharmaceutical chemist 4 yrs.—B.S. in pharmacy b. 3 yrs.—pharmaceutical chemist 4 yrs.—B.S. in pharmacy
Engineering	4 years leading to B.S. in engineering	4 years—B.S. in engineering Some institutions, as Harvard and Columbia (1923) give 3 yrs. professional course after 3 years college preparation leading to professional degree Professional degree in a few institutions after 3 yrs. experience or 2 yrs. additional school training
Nursing	(1911) 2 or 2½ years—27 per cent. 3 or 3½ years—73 per cent.	(1918) 2 or 2½ yrs.—10 per cent. 2 or 3½ yrs.—88 per cent. 4 years—3 schools Graduate course of 1 or more yrs. in a few schools—largest, Teachers College, Columbia University

cine and the ministry; and the absence of a system of guidance by which adaptability to the profession may be predetermined.

The period under consideration has witnessed the breaking up of unit professions into parts each of which now has complete identity. This breaking-up process has been accompanied by a high degree of specialization and the development of levels. Two illustrations will suffice. Twenty-five years ago the practice of

dentistry was a single and complete unit. The field now includes numerous callings in which a number of levels are clearly recognized. In one level would be the dental mechanic, the dental nurse and the dental hygienist; in another the general practitioner, the orthodontist and the dental surgeon; and in another, the research dentist. In like manner the legal occupations include in one level the law clerk; in another, the general practitioner; in another, a wide range of specialists; and in another the jurists. While specialization is to be found in the educational programs of the seven professions under review there is no appreciable recognition of levels. It is inconceivable that the same period of time and the same curriculum would be required to prepare the research physician, as the specialist or as the general practitioner. It is equally inconceivable that it requires the same time or the same curriculum to educate the law clerk as the jurist. Yet, considerations as simple and as fundamental as these have been practically neglected.

As year after year is added to preliminary preparation and to the actual period of professional preparation, the tendency is to adopt the post at the highest level as the aim or goal. This is strikingly illustrated now in medicine and in law. Another illustration will soon be available in dentistry, at the rate the period of preparation is being lengthened in schools of the university type. Some workers are needed at the top posts in every field, but to plan a scheme of education which is primarily adapted for the top level does violence to actual conditions and paves the way for the development of inferior and independent schools for the lower levels. As an illustration, witness the current development of the so-called medical schools of newer types, turning out graduates by the hundred in a brief period of time. Such practitioners are to be found in every city competing for practice with those who have completed the super-type of medical education. Again, it is no wonder that when the Iowa and Wisconsin teacher-training institutions adopted four-year courses, teacher-training departments developed in the high schools as a means of supplying the demand for teachers in the rural schools. Over-extension in terms of length usually results in the establishment of inferior facilities of the short-term type, thus reducing appreciably the gain which was expected.

One may well question the faith which is being placed in pre-service professional education. The older pattern, where education supplemented apprenticeship, seems more reasonable, as a pattern; for through apprenticeship one discovered whether or not he was adapted to the profession, and he became aware of the dominant and important problems and techniques, thus establishing a background of experience and reality to which his formal, professional education could be related. Now, in medicine, for example, one touches reality only after the formal preparation is past. If the profession be distasteful it is too late to change, as the individual is too old and the expenditure of money has been too great.

It is our opinion that a more favorable pattern for education in the professions under re-

TABLE III. THE NUMBER OF PRACTITIONERS IN EACH OF THE PROFESSIONS

Occupations	1850	1860	1870	1880	1890	1900	1910	1920
Physicians	40,564	54,543	62,383	85,671	104,805	132,225	157,966	144,977
Lawyers	23,939	33,193	40,736	64,137	89,630	114,703	122,149	122,519
Dentists	2,923	5,606	7,839[1]	12,314	17,498	29,704	39,997	56,152
Clergymen	26,842	37,529	43,874	64,698	88,203	111,942	133,988	127,270
Pharmacists	6,139	11,031	17,369	27,700	46,375	57,346	67,575	80,157
Engineers	512	27,437	4,703	8,261	43,239	87,070	88,755	136,121
Nurses	[2]	8,132[3]	12,162	15,601	47,586[4]	121,269[5]	193,625	281,094

[1] Apprentices, 165.
[2] No nurses mentioned.
[3] Plus midwives, 271.
[4] Including midwives.
[5] Including 5,630 midwives.

view would be a shorter period of pre-service education in which practical experience would come early. This first period would include only the minimum of training for entrance into the profession; then would come a period of actual practice, either independent or with associated groups, to be followed by re-entry into the professional school for those destined for the more complex work of the higher levels. In medicine and dentistry this periodic re-entry should be required.

The present full-time, pre-service pattern seems to be open to the criticism that it continually inducts into professional service individuals who may or may not be adapted to the profession chosen, and that once in the profession there is no obligation to return for advanced education, the supposition being that "they are educated for life."

TABLE IV. POPULATION PER MEMBER OF OCCUPATION

	1880	1890	1900	1910	1920
Medicine	585	601	576	582	729
Law	782	702	664	753	863
Dentistry	4,073	3,597	2,562	2,299	1,883
Theology	775	714	681	686	830
Pharmacy	1,811	1,357	1,325	1,361	1,319
Engineering	6,071	1,456	873	1,036	777
Nursing	3,215	1,322	627	475	377

This table is in terms of the number of people per practitioner rather than the usual designation of practitioners per 100,000. It shows directly the unit of population served by each. Much variation exists in different sections of the country and in rural and urban communities. The extent of this variation can be determined by comparison of the practitioners and the population of the section or community in question.

The tendency is for a physician to serve more people, a lawyer more and a dentist fewer, etc.

TABLE V. NUMBER OF SCHOOLS IN EACH PROFESSION

	1870	1880	1890	1900	1910	1920
Medicine		90	129	151	135	77
Law	28	48	54	96	114	107
Dentistry	9	16	27	54	53	40
Theology	80	142	145	154	184	185
Pharmacy	12	14	30	53	79	53
Engineers	70	85				126
Nurses		15	35	432	1,129	1,755

TABLE VI. NUMBER OF STUDENTS ENROLLED IN EACH PROFESSIONAL SCHOOL

Professional school	1870	1880	1890
Medicine	6,194	11,929	15,484
Law	1,653	3,134	4,518
Dentistry	257	730	2,696
Theology	3,254	5,242	7,013
Pharmacy	512	1,347	2,871
Engineering			
Nursing		323	1,552

Professional school	1900	1910	1920
Medicine	25,213	21,394	14,242
Law	12,516	19,567	20,992
Dentistry	7,928	6,439	8,809
Theology	8,009	11,012	7,216
Pharmacy	4,042	6,226	5,026
Engineering	12,415	23,241	49,139
Nursing	11,164	32,636	54,953

Observations:

(1) Medicine and theology are the professions that were recruited earliest through school training. In 1870 law, dentistry, pharmacy and nursing were recruited largely through apprenticeship.

(2) The number of students in engineering has increased rapidly, due largely to the great industrial development of the last two decades. Medicine and theology show a marked decrease.

TABLE VII. NUMBER OF GRADUATES FROM THE SCHOOLS OF EACH OF THE PROFESSIONS

Profession	1850	1860	1870	1880
Medicine				3,241
Law				1,089
Dentistry	35	65	181	266
Theology				719
Pharmacy				186
Nurses				157

Profession	1890	1900	1910	1922
Medicine	4,556	5,219	4,448	2,598
Law	1,424	3,241	4,233	5,068
Dentistry	943	2,029	1,588	1,619
Theology	1,372	1,773	1,759	764
Pharmacy	759	1,130	1,715	1,854
Nurses	471	3,456	8,140	14,980

TABLE VIII. AVERAGE ENROLLMENT IN THE SCHOOLS OF EACH PROFESSION

	1870	1880	1890	1900	1910	1920
Medicine		133	120	167	158	185
Law	59	65	84	130	171	196
Dentistry		45	100	146	121	220
Theology	41	37	48	52	60	39
Pharmacy	43	96	96	76	79	95
Engineering						390
Nursing		21	44	26	29	31

TABLE IX. NUMBER OF POPULATION PER GRADUATE IN EACH PROFESSION

	1890	1890
Medicine	15,475	13,816
Law	46,056	44,204
Dentistry	188,555	66,752
Theology	69,757	45,880
Pharmacy	269,654	82,935
Nursing	319,464	133,647

	1900	1910	1920
Medicine	14,561	20,677	40,689
Law	23,448	21,727	20,858
Dentistry	37,454	57,917	65,294
Theology	42,862	52,287	138,364
Pharmacy	67,252	53,628	57,018
Nursing	21,989	11,299	7,057

TABLE X. THE ESTIMATED TURNOVER AMONG PRACTITIONERS IN EACH OF THE PROFESSIONS BASED ON A WORK EXPECTANCY OF THIRTY YEARS

	1850	1860	1870	1880
Physicians	1,352	1,818	2,079	2,856
Lawyers	798	1,106	1,358	2,138
Dentists	97	187	261	410
Clergymen	895	1,251	1,462	2,157

	1890	1900	1910	1920
Physicians	3,494	4,408	5,266	4,833
Lawyers	2,988	3,823	4,072	4,084
Dentists	583	990	1,333	1,872
Clergymen	2,940	3,731	4,466	4,242

This estimate is used to determine the extent to which the graduates supply the normal demand.

The work expectancy of thirty years is an estimate only. The true tenure can be determined by further study. It will vary in the several professions, especially in nursing where women constitute the greater part of the membership.

TABLE XI. ESTIMATED PERCENTAGE OF TURNOVER SUPPLIED BY THE GRADUATES FROM SCHOOLS

Profession	1850	1860	1870	1880
Physicians				1.13
Law				.51
Dentistry	.36	.34	.69	.65
Theology				.33

Profession	1890	1900	1910	1920
Physicians	1.30	1.18	.84	.54
Law	.47	.84	1.04	1.24
Dentistry	1.62	2.05	1.19	.86
Theology	.46	.47	.39	.18

The above figures are based on an average tenure of thirty years in a profession. The number of graduates at each decade is divided by the number of practitioners. If the number of graduates equalled the turnover the percentage would be 1.00. The thirty years' tenure is an estimate only. It would vary in the professions. Extensive research is necessary to establish the correct average tenure.

Observations:

(1) There is reflected in dentistry and medicine the great increase in supply during the decade 1890–1910, which probably resulted from the low standards of entrance into the profession and the influence of proprietary schools so numerous at this time.

(2) There is reflected in dentistry and law during earlier decades the recruiting of the profession by means of apprenticeship. The rapid increase in graduates at present will tend to overcrowd the profession unless for some reason an abnormal demand exists.

(3) The present tendency in medicine may lead to an undersupply of graduates to meet the normal turnover in the profession. The present percentage is perhaps too low, due to the fact that in 1890, 1900 and 1910 the profession was overstaffed. Even so, the present supply is low.

(4) The theological seminaries seem to be losing their prestige in supplying recruits for the ministry. The profession is recruited from the graduates of liberal arts colleges and other sources.

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